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WHAT CAN OUR SCHOOLS DO FOR FOUNDRY APPRENTICES?

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During the last few years the subject of the education, or rather want of education, of the Foundry apprentices and workingmen has frequently been discussed in Foundrymen's meetings, and the lack of interest in and comprehension for the technical details of their chosen vocation by our young men, whether foundrymen or not, has been declared an everlasting source of annoyance and disappointment to employers and a drawback to employees.

In view of these frequent discussions of a serious and all important subject, interesting not only to the Foundrymen, but to every thoughtful citizen, I did not consider it out of place to present to you this question of the education of apprentices in a different aspect from that it has been usually discussed.

To approach this subject with satisfaction we must first ascertain the causes why there is such an apparent lack of interest and understanding among the overwhelming majority of our young men for the so-called technicalities of their vocation. Having found the probable cause, then, secondly, the question will naturally be asked what can be done to remove the cause or causes, and then, thirdly, review the reasons why it should be necessary to make any efforts in that direction for the benefit of the Foundrymen in particular, and in our industries and commerce in general.

Intelligence, knowledge and skill in the arts and industries fosters culture, civilization and national prosperity, and in return again, culture and civilization promotes industrial and commercial activity.

Now, while the home is essentially the prime source where character is formed, faculties developed and intelligence acquired, and no school can take the place of the home, neverthe-

less the school is an indispensible and influential supplement and aid to the home, inasmuch as the school gives finishing touches to the home life; the school does many things in a systematic way which have been done at home in an irregular way, and many things are taught in school which no home ever can undertake to teach. Among those things for which the school alone is prepared to teach is the knowledge of such technical and scientific matters pertaining to industries, commerce and municipal life, that are essential and indispensible nowadays for the success of our own national progress and prosperity. Not only industrially and commercially so, but socially and politically as well, because culture and civilization rests upon the intelligent application of that broad knowledge of the laws of nature which we comprehend under the general term of science. This being so we can get no satisfactory answer to our inquiry why there is such a lack of interest among our young people in the technicalities of their daily work and life, as workers and citizens, unless we ascertain to what extent, if any, our schools have contributed to a knowledge and comprehension of technical and scientific matters as far as these are related to our daily life and vocations. To raise such a question does not in the least lessen our respect and admiration for our public school system Schools are the creation of the social, religious and political activity of a nation, and as the conditions of life change, causing a change in the necessities and mode of living and working o. the people, so must the methods in our schools change to prepare the coming citizen; to furnish him with the requisite knowledge and understanding of how to adapt himself with best advantage to those necessities and modes of living brought about by the changed conditions of life. Now, fortunately for us, and creditable to our intelligent perception of the condition of things there is a growing conviction among thinking people, and notably among professional educators, of the need in our schools for a change in methods and curriculum in order to do justice to requirements for technical and scientific knowledge of various kinds, which requirements are due to the rapid development and expansion of our industries and commerce and political influence abroad. Our educators perceive that our schools have not been able to follow quick enough these demands created by

changed conditions in our national life. And in this unavoidable inability to change methods and curriculum in our schools and the necessary training of teachers quick enough to conform to present pressing needs we find the secret of the want of interest and understanding with so many of our young men for the technical scientific subjects of their work and life as citizens.

Thus far literary subjects formed the main part, and received most attention, in the curriculum, from the grammar through the high schools, because until recently our high schools were, and to a large extent still are, primarily preparatory schools for our colleges, and therefore the colleges shaped the curriculum of the high schools to suit their purposes. The grammar schools being natural feeders of the high schools, their curriculum was shaped to suit the needs of the high schools. The needs of the engineer, the mechanic and clerk received very scant, if any, attention at all, although out of every hundred school boys and girls only five go to college, while 95 enter industrial and commercial pursuits or marry. Thus far these 95 have had to be satisfied with the leavings so to speak, with the crumbs left upon the table by the five who went to college. Here and there efforts were made to recognize the rights and needs of the 95 not going to college by the introduction of elective studies into the high school curriculum, but with indifferent success apparently, because, as long as colleges admit high school graduates without examination on a high school certificate the colleges are necessarily bound, for their own sake, to have the high school curriculum shaped to suit their needs, which is chiefly on literary lines.

This unsatisfactory condition of our schools, unsatisfactory to those who enter industrial or commercial pursuits, is being recognized by our foremost educators. Thus, in a recent meeting of the New England Association of School Superintendents, it was pointed out by one of the speakers that, since 59 per cent. of our children are graduated from grammar schools, 29 per cent. enter high schools, 12 per cent. pass through high schools and only 5 per cent. go to college, the lower grades were most important as influencing much the larger number of pupils and should not, therefore, be arranged solely with reference to the demands of the higher institutions.

At the last annual convention of the American Educational Association President Green addressed the convention on, "The Duty of the National Education Convention in Shaping Public Educational Policy," in the course of which he said: "It is safe to say that at least one-half of all the time spent in the schools is wasted by reason of its being spent on unprofitable subjects." To be just to our schools let us not forget that since the Civil War we have been in a constant state of transition, politically, socially, industrially and commercially. Before we were able to adjust ourselves and our interests to certain changed conditions, new changes took place, requiring new adjustment to altered circumstances. Now school systems, methods of training teachers, methods of teaching and changes in curriculums could not possibly be adjusted so quickly as the demands, created by rapid changes in social conditions seem to make it desirable. While no doubt too much conservatism is displayed here and there, yet the fact that our best educational authorities recognize the necessities and demands of the 95 pupils who do not go to college is very encouraging. Only last year our State Normal School added another year to the teachers' course, and manual training and kindergartens have a good start in this country also.

We must not forget that our high schools take the place of the academies of 30 and 40 years ago. Now the old academies were primarily preparatory schools for the college, and when the high schools took the place of the academies they assumed the function of being the preparatory schools for college. However, with the gradual strengthening of the hold of the State on the public school system, the high schools drifted under the domination and support of the State. Thus they became part and parcel of the public school system, and the high schools were forced into the undesirable dual position of being preparatory schools for colleges and having their curriculums adapted to the needs of the latter and at the same time serve the needs of the people, viz., give to the 95 who do not go to college the same rights and advantages as are accorded to the 5 who go to college.

To make this dual demand satisfactory to both parties is not so easy, since it is not desirable at all to engraft trade

schools upon our public schools, but grammar as well as high schools ought by all means to retain their character as broad, liberal educators and builders of foundations only upon which the pupil can rear his own structure successfully later on.

Educational authorities assure us that the necessary changes can be made, and in a number of cities manual training high schools for the needs of our industries, and commercial high schools for our commerce have been established side by side with the literary high schools, with consequent beneficial influence upon the grammar schools. Let me show you by comparison the radical difference in the curricula of two schools, one of the schools, or rather system of schools, being devoted to the education of apprentices and workingmen exclusively, beginning with the pupils at 13 years of age, when they leave the common schools, thus taking in two years of the age of our grammar school scholars, while the other curriculum is used in the schools of one of our American cities with an exclusively manufacturing population, and is typical of our grammar and high schools.. The apprentice schools of the curriculum of which I give you an extract, are the so-called progressive schools at Munich, Germany, where I was born, and the programme given has been followed and been improved upon since 1870. Please do not understand me as if I were in favor of introducing European school methods into our own schools. I have no such idea, and understand very well that our American schools must be developed on lines suitable to our own social and political conditions. But you will all agree that the subjects taught, as given below, must ever form the substance with which to build the foundation for the education of the 95 of our children who do not go to college, and will enter industrial or commercial pursuits.

The subjects taught the first year embrace the decimal system. Exercises in large sums. Monetary, weight and measure system. Practical business problems. Reading of prose and poetry. Analysis of the German language. Memorizing select poetry. Correct writing. Orthography. Exercises in writing foreign words. Composition with reference to the practical necessities of the pupil. Writing letters and communications. Geography. German history. Division and characteristic fea-

tures of the universe. Species of animals and distinct features of such animals which furnish raw material for the various industries. Freehand and geometrical drawing.

Second year. Advanced mathematics with application to everyday practice. Examples from everyday business life. Advanced reading. Compositions and letters selected by the pupils. Business letters. Geography. History. Natural science. The study of plants and minerals which are useful chiefly in commerce, industry, trades and agriculture and instruction in their technical uses. Drawing of ornaments and from model.

Third year. More difficult reading and writing exercises. Compositions of subjects selected by the pupil from his daily occupation. Various forms of business and private letters. Geography of the world. Lectures on geographical subjects. Lectures on historical persons, political events and social and industrial condition of Germany. Lectures on gravity, motion, light, heat, atmosphere, magnetism, electricity and such natural phenomena as are made serviceable to mankind. Drawing with particular reference to its application to art industry.

In the advanced course of the progressive schools for workingmen and apprentices none are admitted under 16 years of age and pupils must have had two years of sharp practice. Diplomas are given to the best scholars and a few are sent to the polytechnic school at the city's expense.

The three years' course includes history of the 19th century. Geography of individual countries, their physical condition, resources, commerce, industries, customs and institutions. Lectures on discoveries and inventions. German literature and its history. Law and institutions. Conception and aim of the State. Constitution of the German Empire. Organization and business methods of the courts. The State, parliamentary and municipal elections. Laws of citizenship, marriage, manufacturing enterprises. Taxation. Laws concerning industrial associations, societies and public meetings. Police laws and regulations. Introduction to political economy. Development of the economic terms, property value, economy, capital. Production, natural resources, labor and capital, division of labor, the economic importance of machinery, the creation and function of capital, cost and economics of production, conditions of in-

dustrial life, tariff. Nature and condition of railroad and other transportation. System of weights and measures. Prices, credit, commerce. Wages and profit, their rise and fall. Strikes. Interest and dividends. Economic and wasteful consumption. Distribution. Luxury, its nature and justification. The social-economic system of the modern state. Co-operation. Unrestricted competition. Property right and right of inheritance. Associations and corporations. Socialism and communism. Arithmetic and Geometry. Business and contract calculations. Bookkeeping for tradesmen and mechanics, for small business men, for large concerns. The use of drafts, checks, indorsement, protesting, etc. Experimental lectures on cohesion, density, gravitation, motion and other physical laws of nature. Particular attention is paid to subjects applicable in daily practice of shop and factory. The mechanical powers, the wedge, lever, screw, inclined plane, etc. Static and dynamic forces. Momentum, specific gravity, motion of liquids, elasticity, air pump, barometer, thermometer, heat, steam, magnetism, electricity, telegraphy, galvanism, light and sound. The air and its function in heating, oxidation, reduction, bleaching, acids, bases, alkalies, salts, water; its destilation, boiling, evaporation, solution, freezing mixtures, precipitation, hard and soft water, boiler scale. Metals, their chemical and physical properties, alloys. Decomposition, fermentation, preservation of food. French and English languages. Mechanical drawing. Lectures on machine design and the mechanical powers.

Let us now compare this curriculum of an apprentice and workingmen's school with the curriculum of a grammar and high school of one of our manufacturing cities.

Grammar School.—First Grade. Fifth reader, first half. Spelling. Special attention to spelling in manuscript work. Advanced speller. Phonics. Writing. Drawing. Arithmetic. Denominate numbers. Practical measurements. Grammar. Parsing. Analysis, including subordinate clauses. Part of advanced geography. Elementary physiology. Composition. Second Grade. Fifth reader. Advanced speller. Common school Dictionary. Special attention to spelling in all exercises. Phonics. Writing. Drawing. Arithmetic as found in ordinary text books. Parsing and analysis of words. Advanced

geography. Elementary physiology. Composition. Civil government. United States History.

High School.—In this high school an attempt is made not to make it an exclusive preparatory school for college, and at the same time recognize the modern tendency to have a number of the studies elective, that is open to the choice of the pupils. Hence the school is divided into the Latin Scientific Course in which is offered the first year, Latin, English, Algebra, English history, physical geography, physiology and drawing.

The second year, Latin, algebra, plane geometry, general history, drawing, English. The third year offers Latin, English, solid geometry, chemistry and physics, botany, drawing. In the fourth year, Latin, English, plane trigonometry and arithmetic, geology, astronomy, physics, drawing.

In the Modern Language Course we have the same subjects, but with the Latin left out and German substituted.

In the Classical Course we have the same subjects as in the Latin Scientific Course, but only drawing in one year and Greek in three years with botany, geology and astronomy left out.

The last or English Course extends only through two years and gives business forms and commercial arithmetic instead of Latin.

When comparing these two curricula we notice the absence of many subjects which would have a close relation to the future needs and necessities of the 95 of our school population who never go to college.

Admitting the desirability of avoiding specialization in our schools and recognizing the great value of a general, or so-called liberal, education, preceding choice of vocation, we have a right to expect nevertheless that this liberal education recognizes the future needs of the majority of those whom our schools are to benefit as fully as the needs of the minority are recognizing.

The future industrial worker, or foreman, the railroad man, the future clerk or bookkeeper, the future housekeeper and mother learns nothing, or next to nothing, of the great realm o. nature and its inexorable laws; they get no proper conception if they get any conception at all, of the wealth and nature of our resources, the location and their nature, which are the founda-

tion, the backbone and mainstay of our material wealth and commercial supremacy. Without the wealth of our resources, without the exceptional purity of our minerals, of the strength of our mines, we could not manufacture and sell as cheaply, transport as cheaply and at the same time live as comfortably as we do.

Where are the choice, though not necessarily large, collections of specimens of our principal resources which ought to be found in every school house and high school, also specimens of the stages of production of the products of local industries, which ought to be the daily help for our teachers and object lessons for our young men, so that they may get an intelligent comprehension of the contents of their country's storehouse out of which they must get a living. A few years ago I was curious to see the natural history museum of a normal school, and I found very little, the most of which consisted of minerals. I then had in my garret as much of the principal mineral resources of our country to show as there was at this important training school for teachers.

Where is the high school graduate, nay, where is the average teacher, doctor, lawyer or preacher, who can explain off hand as he or she ought to be able to explain, the economic relation of our resources to the development and further maintenance of our industries, agriculture and commerce, our transportation and shipping and the possible influence of these relations to our future welfare and political standing as a nation, and our successful competition with foreign countries and their resources, and the possibility of keeping up that competition for any length of time.

Some time since I happened to show a few specimens of our Lake Superior ores and gold ores to the graduate of a high school, and he had never seen any, did not know what they were, and of course had no conception at all how to connect the contents of our Lake Superior and Colorado mines with the success of our industries and the intricate economic and political questions and national problems which arise from the reaction upon each other of the manifold human activities, caused in a large nation like ours by the possession of such enormous wealth. How could that young man vote intelligently for

representatives who were to shape the nation's economic and political policies for good or evil? What guide was to him his Latin or Greek, his smattering knowledge of astronomy and trigonometry of Greek mythology and ancient history in shaping the destiny of his life and of his country in accordance with the necessities of the fierce struggle for existence in modern times. Would the study of economics, of civics, of modern languages, of natural history, not develop the faculties just as well, as our highest educational authorities claim it would, and at the same time make our young men valuable to themselves, more useful to their country and therefore better citizens?

Moreover, if the primary principles for the acquisition of such knowledge and foundation to build on was considered essential and important enough to form part of the curriculum of schools for apprentices, laborers and workingmen as long as 30 years ago in a monarchical country, why should such knowledge not be also essential and important for the education in our high schools for the coming lawyer, doctor and preacher in a country where everyone contributes share and share alike in the shaping of the destiny of his country? What is destiny anyway if it is not the cumulative result, the aggregate of the daily and hourly thoughts and actions of all the people of a given nation?

Now gentlemen, herein lies the secret of the indifference and antipathy of foundrymen's apprentices and young men in general for the technicalities and duties of their chosen vocation. What they have learnt at school bears little or no relation to the work they have to do after leaving school; no proper foundation is laid whereupon to rear a systematic structure of trade instruction; their talents are left lying dorment, and their mind is as unable to comprehend the necessities of the situation and the nature of the duties they are expected to perform, as a clerk who never wielded anything heavier than a tack-hammer is unable to swing a 15-pound sledge in a smith shop all day long. Do not blame him. It is not his fault. He is merely the product of his home and school training and environment. Feed his mind on a curriculum similar to the one in use in the apprentice school at my home where you notice that all instruction tends to practical application in daily life and yet is as lib-

eral, as broad an education, except Greek and Latin, than the high school curriculum I gave an example of. Banish politics forever from our schoolhouses and let in the invigorating sunshine of kindergartens, of manual training, of nature study, of modern language, of civics and economics, then the reasoning faculties will be aroused as well as the retentive faculties are developed, none to excess. But this cannot be done without improving the pay and standing of our teachers.

President Eliot of Harvard University says our youth should be trained to observe accuratetly, to record correctly, to compare and infer justly and to express cogently the results of these mental operations. These, he says, are the things in which the population as a mass must be trained in youth, if its judgment and reasoning power are to be systematically developed. His training, President Eliot says, ought to be such as to give the young man a proper vision of the great range of knowledge and capacity needed in the business of the world, then he will respect the trained capacities which he sees developed in great diversity in other people.

In the report of a committee of "The Society for the Promotion of Engineering Education," the following passage occurs: "Your committee are of the opinion that heretofore we all have relied too much upon the common schools and upon native ability. We have conceived the generic American boy or girl as conditioned in a single way and then have provided educational ways and means to fit this particular condition. But the average or generic boy is no particular boy, and his average condition fits few particular cases. We forget that they are particular boys who are to do the business of the coming generation, and these particular boys are of all ages, conditions, tastes and capabilities. Any person wishing to improve himself and to make himself a more useful citizen should find the opportunity for gratifying this high ambition. We have an excellent system of public and endowed schools in which are more or less well taught the elements of knowledge and in which a very considerable mental capacity is developed. After leaving these schools our boys know something, so far as knowledge can be gained from books and oral instruction, but they can do little or nothing. This mental, abstract and memoriter education needs

to be supplemented by a manual, industrial, industrial art, commercial or engineering education if the boy is to become a doer, a director. He then not only konws something, but he can do something, and because he can do something he is worth something to society. However much a man knows, he is a drone in the hive if he cannot do something for the common good. It must be understood we are not asking for utilitarian education in place of mind informing and mind developing education, but to supplement such cultural education as the boy or girl may have been able to obtain. Neither do we care to insist upon young people availing themselves of this utilitarian education. We are only concerned that it should be offered. We are not concerned to find the pupils, we are only concerned to find schools."

Now gentlemen, as long as the state assumes the right to educate the children of the people, leaving them no choice, then the state has the duty to provide such educational facilities as will benefit all citizens alike according to their respective necessities, and for the state's own welfare. The state now, through the high schools, makes ample provisions to prepare those who are to become apprentices in the art of literature, of serving the community and their own interests, as theologians, as doctors, as lawyers, as soldiers and engineers. What reasons are there why not equally ample provisions should be made by the state for the education of those who become apprentices to be founders, machinists, carpenters, locomotive engineers, clerks, bookkeepers, foremen, superintendents of shops, etc. Is the intelligence and knowledge of the one not as essential to the welfare of the state as the other?

Every one of you know only too well what an annoyance, irritation, bother and discouragement and loss the average apprentice is with his indolence and indifference and lack of training, to comprehend his duties and what is wanted of him and best for him. A college would never receive its literary apprentices with so little, or no preparation, to take up the details of their chosen vocation. No matter how many libraries are built, how many trade schools, night schools and special schools there are opened, they will and can serve their purpose, not as fully and advantageously, and therefore will not be as beneficial as

expected if those, for whose benefit the money was expended have no previous training for an understanding and appreciation of the nature and value of those things which are offered to them.

If the colleges demand a literary preparation of their apprentices, our industries and commerce demand a technical, a scientific, a commercial preparation for theirs. All of us depend upon each other's efficient and successful work for our peace, happiness and welfare. Literary training for those who go to college, manual training for those who are to carry on our industries, commercial training for those who are to engage in commerce, then the foundry industry will prosper and the foundrymen will have a better opportunity to get apprentices, workingmen and foremen who are interested in and have a comprehension for the details and technicalities of their work.

In conclusion let me say that this question of training of apprentices is as much a moral question as it is a material one. The proper performance of our duties towards ourselves and our fellow citizens is a high, a noble duty. The conscientious daily and hourly performance of our various duties as men and women, as husbands and wives, as citizens and mothers, as employers and employees are synonymous with a high standard of morality, and therefore we are unjust if we blame those for neglect of duty and consequent low moral standard whom the state, that is we, has neglected to instruct properly in the performance of their duty. Kindergartens, manual training schools, drawing schools, gymnasiums, play grounds, if rightly conducted and free from political or social influence give language, form and body, as it were, to religious teaching similar as an object lesson, an experimental lecture gives a better comprehensive, tangible understanding of the subject taught than book teaching.

The German philosopher Fichte once said: That a people whose lowest classes possess the broadest and most general education, will be the mightiest and happiest of the time, invincible to all neighbors, envied by contemporaries and a model for their imitation." Why should the United States not try to attain to this proud position and distinction?